

METHOD AND APPARATUS FOR PERFORMING OVERLOAD CONTROL FOR HSS RECOVERY

BACKGROUND

[0001] 1. Field

[0002] Communication systems, such as the evolved packet system (EPS), can provide radio interface and packet core network functions for broadband wireless data access. The evolved packet system can include core network functions such as mobility management entity (MME), packet data network gateway (PDN-GW), and serving gateway (S-GW).

[0003] 2. Description of the Related Art

[0004] The evolved packet system (EPS), the successor of general packet radio system (GPRS), provides radio interfaces and packet core network functions for broadband wireless data access. EPS core network functions include the mobility management entity (MME), the packet data network gateway (PDN-GW) and the Serving Gateway (S-GW). An example of an evolved packet core architecture is illustrated in FIG. 1 and is described by third generation partnership project (3GPP) technical specification (TS) 23.401, which is incorporated herein by reference in its entirety. A common packet domain core network can be used for both radio access networks (RANs), the global system for mobile communication (GSM) enhanced data rates for GSM evolution (EDGE) radio access network (GERAN) and the universal terrestrial radio access network (UTRAN).

[0005] Currently, second and third generation circuit switched (CS) infrastructure or support for an internet protocol (IP) multimedia subsystem (IMS) may be required to support voice and especially short message service (SMS) services in packet switched (PS), for example, circuit switched fallback (CSFB), single radio voice call continuity (SRVCC), and IMS based voice over IP (VoIP).

[0006] As mentioned above, the evolved packet system, as a successor of the general packet radio system, can provide new radio interface and new packet core network functions for broadband wireless data access. In such configurations, the home subscriber server (HSS) can have numerous interfaces with varying network entities, such as the evolved packet system (EPS), an internet protocol multimedia subsystem (IMS), policy charging control function (PCC), authentication, authorization, and accounting (AAA) function, etc. These interfaces allow an operator to provision services as appropriate to its subscribers. The HSS must be adequately protected from overloading due to all of these related interactions; if adequate overload protection is not implemented, the user will not receive any services during overload conditions.

[0007] Some of the issues noted in networks, as described, for example, in TR 23.843, includes a flood of registrations caused by special mobility events. In other words, masses of mobile users may attempt to simultaneously perform registration procedures such as Attach, or location updating. An example of such a scenario is one where a train or a bus is crossing a local area identification (LAI)/routing area identification (RAI) border, or when an airplane arrives at an airport. Additionally, there may be situations where there are scattered 3G/4G coverage areas, which result in frequent radio access technology reselection by user equipment such as, for example, smart phones. Additionally, restart of remote access nodes, such as RNC and BSC, may cause a large

number of registration attempts, depending upon the behavior of the base stations controlled by the restarted radio access network nodes. There could also be a flood of resource allocation requests for mobile originating services, if large numbers of mobile users attempt to simultaneously initiate signaling procedures in order to allocate resources for mobile originating services, such as establishing bearers. Also, large numbers of mobile terminated events for users belonging to a specific HLR/HSS, such as, for example, sending an SS message to say happy new year at the same time may cause excessive signaling words within the public land mobile network (PLMN).

[0008] According to the related art, overload control indication from the home subscriber server to such serving nodes is discussed, for example, in Publication TR 23.843, which discusses solutions in section 6.2 thereof. This provides a high level indication that the HLR/HSS includes an overload indication in each response message to the network management entity such as the MME/SGSN/MSC (mobile management entity/serving GPRS support node/mobile switching center). The MME/SGSN/MSC restricts the flow of messages toward the home subscriber server. However, there is no consideration of the severity of the overload, nor any information regarding the detail handling of the overload indication in the serving nodes.

SUMMARY

[0009] The invention can include, in certain embodiments, a method comprising transmitting communications traffic to a home subscriber server, and receiving an overload indicator from the home subscriber server. The overload indicator can include a severity indicator. Traffic volume transmitted to the home subscriber server is adjusted based upon the severity indicator.

[0010] In other embodiments, the invention can include an apparatus comprising at least one memory including computer program code, and at least one processor. The at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to enable transmission of communications traffic to a home subscriber server, and to receive an overload indicator from the home subscriber server. Traffic volume transmitted to the home subscriber server is adjusted based upon the severity indicator.

[0011] In another embodiment, the invention can include an apparatus comprising at least one memory including computer program code, and at least one processor, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to receive communications traffic on a network, and to transmit an overload indicator at such time as traffic volume exceeds a threshold. The overload indicator includes a severity indicator. The apparatus can also transmit a NO MORE OVERLOAD indicator when the overload condition is alleviated.

[0012] In another embodiment, the invention can include a method comprising processing communications traffic on a network, and transmitting an overload indicator at such time as traffic volume exceeds a threshold. The overload indicator can include a severity indicator. The method can also transmit a NO MORE OVERLOAD indicator when the overload condition is alleviated.

[0013] In another embodiment, the invention can include a method comprising processing communications traffic on a